

CLAIMS

1. (Amended) A multi-frequency antenna duplexer comprising:
a package, and
a plurality of antenna duplexers, mounted in said package, having
5 different passing bands from each other,

wherein each of said plurality of antenna duplexers includes a
transmitter surface acoustic wave (SAW) filter and a receiver SAW filter
having a passing band different from the passing band of the transmitter SAW
filter,

10 the transmitter SAW filter of said each of the plurality of antenna
duplexers is formed on a first piezoelectric substrate, and

the receiver SAW filter of said each of the plurality of antenna
duplexers is formed on a second piezoelectric substrate.

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15 2. (Amended) The multi-frequency antenna duplexer of claim 1,
wherein in each of the receiver SAW filters, a phase shift substrate for
rotating a phase of a transmission band of said multi-frequency antenna
duplexer including said each of the receiver SAW filters is incorporated
between the first piezoelectric substrate and the second piezoelectric
20 substrate in the package.

3. (Amended) The multi-frequency antenna duplexer of claim 2,
wherein at least first and second transmitter SAW filters are formed
on the first piezoelectric substrate,

25 at least first and second receiver SAW filters are formed on the second
piezoelectric substrate,

the first transmitter SAW filter and the first receiver SAW filter are

disposed nearly adjacent to each other by way of the phase shift substrate,
and

the second transmitter SAW filter and the second receiver SAW filter
are disposed nearly adjacent to each other by way of the phase shift substrate.

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4. (Amended) The multi-frequency antenna duplexer of claim 2,
wherein the phase shift substrate is formed in an inner layer of the
package.

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5. An multi-frequency antenna duplexer comprising:
a package, and
a plurality of antenna duplexers, mounted in said package, having
different passing bands from each other,

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wherein each of said plurality of antenna duplexers includes a
transmitter filter and a receiver filter having a passing band different from a
passing band of the transmitter filter,

at least one of the transmitter filter and the receiver filter is a bulk
wave filter, and

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when one of the transmitter filter and the receiver filter is the bulk
wave filter, another is a surface acoustic wave (SAW) filter.

6. The multi-frequency antenna duplexer of claim 5,

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wherein the receiver filter of any one of the plurality of antenna
duplexers is the SAW filter, in the SAW filter, a phase shift substrate for
rotating a phase of a transmission band of the antenna duplexer including the
SAW filter is incorporated in the package.

7. The multi-frequency antenna duplexer of claim 6,
wherein the phase shift substrate is formed in an inner layer of the
package.

5 8. (Amended) A multi-frequency antenna duplexer comprising:
a package,
two antenna duplexers, mounted in said package having, different
passing bands from each other, and
a branching filter for coupling antenna terminals of the two antenna
10 duplexers and one antenna terminal included in the package,
wherein each of said two antenna duplexers includes a transmitter
surface acoustic wave (SAW) filter and a receiver SAW filter having a passing
band different from a passing band of the transmitter SAW filter,
the transmitter SAW filter of each of the two antenna duplexers is
15 formed on a first piezoelectric substrate, and
the receiver SAW filter of each of the two antenna duplexers is formed
on a second piezoelectric substrate.

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20 9. (Amended) The multi-frequency antenna duplexer of claim 8,
wherein in each of the receiver SAW filters, a phase shift substrate for
rotating a phase of a transmission band of said multi-frequency antenna
duplexer including said each of the receiver SAW filter is incorporated
between the first piezoelectric substrate and the second piezoelectric
substrate in the package.

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10. (Amended) The multi-frequency antenna duplexer of claim 9,
wherein at least first and second transmitter SAW filters are formed

on the first piezoelectric substrate,

at least first and second receiver SAW filters are formed on the second piezoelectric substrate,

the first transmitter SAW filter and the first receiver SAW filter are
5 disposed nearly adjacent to each other by way of the phase shift substrate,
and

the second transmitter SAW filter and the second receiver SAW filter
are disposed nearly adjacent to each other by way of the phase shift substrate.

10 11. (Amended) The multi-frequency antenna duplexer of claim 9,
wherein the phase shift substrate and the branching filter are formed
in an inner layer of the package.

12. A multi-frequency antenna duplexer comprising:
15 a package,
two antenna duplexers, mounted in said package, having different
passing bands each other, and

a branching filter for coupling antenna terminals of the two antenna
duplexers and one antenna terminal included in the package,
20 wherein each of said two antenna duplexers includes a transmitter
filter and a receiver filter having a passing band different from a passing band
of the transmitter filter,

at least one of the transmitter filter and the receiver filter is a bulk
wave filter, and

25 when one of the transmitter filter and the receiver filter is the bulk
wave filter, another is a surface acoustic wave (SAW) filter.

13. The multi-frequency antenna duplexer of claim 12,

wherein the receiver filter is the SAW filter, in the SAW filter, a phase shift substrate for rotating a phase of transmission band of the antenna duplexer including the SAW filter is incorporated in the package.

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14. The multi-frequency antenna duplexer of claim 13,

wherein the phase shift substrate and the branching filter are formed in an inner layer of the package.